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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
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09/249,728 02/13/99 LOPEZ

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EXAMINER

WM31/0717

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ART UNIT

PAPER NUMBER

2623

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Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trademarks

Office Action Summary

Application No.

09/249,728

Applicant(s)

LOPEZ ET AL.

Examiner

Mehrdad Dastouri

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☐ Claim(s) 1-22 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☐ Claim(s) 1-22 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claims ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are objected to by the Examiner.
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).

Attachment(s)

- 15) ☒ Notice of References Cited (PTO-892)
- 16) ☒ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 17) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) ____.
- 18) ☐ Interview Summary (PTO-413) Paper No(s). ____.
- 19) ☐ Notice of Informal Patent Application (PTO-152)
- 20) ☐ Other:

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 17-20 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. In Claims 17-20, "an apparatus comprising a computer readable medium" does not fall within a statutory class of invention. It is not clear that Claims 17-20 are reciting an apparatus or an article of manufacture.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1-4, 6-11, 13-17, 19, 21 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Aloni et al (U.S. 5,619,429) in view of Neary et al (U.S. 6,016,357).

Regarding Claim 1, Aloni et al disclose a method for detecting defects in a reticle used in integrated circuit chip fabrication comprising:

- (a) obtaining digital image data corresponding to an image of a reticle (Column 2, Lines 34-37; Column 9, Lines 40-42);

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(b) processing the digital image data according to predetermined criteria to identify defects (Column 10, Lines 8-41). Aloni et al do not disclose Step (c) concerning simulating a response that would be produced if the defective reticle were to be utilized in a photolithographic system, by processing the digital image data corresponding to the reticle. Simulation is a well known procedure for modeling manufacturing products as taught by Neary et al. Neary et al disclose a method of repairing a mask for use in lithographic manufacturing of semiconductors comprising the step of:

(c) simulating a response that would be produced if a defective reticle were to be utilized in a photolithographic system, by processing the digital image data corresponding to the reticle (Figure 2, defect 24; Figures 10 and 16; Column 6, Lines 25-67, Column 7, Lines 1-4, particularly Column 6, Lines 59-65. Simulation is performed by obtaining aerial images of the defected mask (reticle) and comparing the aerial image of the defected mask with the aerial image of the ideal mask. Simulation results indicate the defect deviations 78a and 78b as depicted in Figures 16 and 17.). It would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify Aloni et al invention in accordance with the teachings of Neary et al to simulate a response that would be produced if the defective reticle were to be utilized in a photolithographic system, by processing the digital image data corresponding to the reticle because it will provide necessary corrective steps to modify the defective reticle and prevent mass production of the defected masks or reticles.

Regarding Claim 2, Aloni et al further disclose a method according to Claim 1, wherein the digital image data are obtained by scanning the reticle (column 9, Lines 40-42).

Regarding Claim 3, Aloni et al further disclose a method according to Claim 1, wherein the defects are identified in step (b) by comparing the digital image data to reference image data (Column 10, Lines 26-29).

Regarding Claim 4, Neary et al further disclose a method according to Claim 1, wherein step (c) simulated an aerial image which would be produced by the reticle (Column 6, Lines 59-65).

Regarding Claim 6, Aloni et al further disclose a method according to Claim 1, wherein the digital image data are in raster format (column 9, Lines 40-42. A digital image is inherently in a raster format containing rectangular array of pixels that can be addressed individually.).

Regarding Claim 7, Neary et al further disclose a method according to Claim 1, further comprising a step of modifying a format of the digital image prior to performing step (c) (Figure 3; Column 4, Lines 28-37).

Regarding Claim 8, Neary et al further disclose a method according to Claim 1, further comprising a step of providing a reference simulation for comparison to a simulation produced in step (c) (Figure 10, Step 46; Column 6, Lines 35-45).

With regards to Claim 9, arguments analogous to those presented for Steps (a), (b) and (c) of Claim 1 are applicable to Steps (a), (b) and (d) of Claim 9. Regarding Step (c) of Claim 9, Aloni et al further disclose specifying a window around one of the

defects identified in Step (b) (Figure 12, Moving Window 228; Column 25, Lines 63-67, Column 26, Lines 1-22).

With regards to Claim 10, arguments analogous to those presented for Claim 2 are applicable to Claim 10.

With regards to Claim 11, arguments analogous to those presented for Claim 4 are applicable to Claim 11.

With regards to Claim 13, arguments analogous to those presented for Claim 8 are applicable to Claim 13.

Regarding Claim 14, Aloni et al do not specifically disclose a method according to Claim 9, wherein the window is 64 x 64 pixels. The windows specified by Aloni are 32 x 24 pixels. Selection of window size is a designer choice. It would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify Aloni et al and Neary et al combination to specify a window of 64 x 64 pixels because it is one of the most common size of the windows routinely implemented in image processing.

Regarding Claim 15, Aloni et al further disclose a method according to Claim 9, wherein the digital image data processed in step (d) are grayscale data (Column 9, Lines 40-42).

With regards to Claim 16, arguments analogous to those presented for Claim 3 are applicable to Claim 16.

With regards to Claims 17 and 21, arguments analogous to those presented for Claim 1 are applicable to Claims 17 and 21. Regarding Claim 21, Aloni et al further

disclose a processor for executing stored program instruction; and a memory connected to processor for storing the program instructions steps (Figure 1/ 2 and 13, Processor 67. Memories for storing the program instruction steps are inherently a part of and necessarily connected to the processor.).

With regards to Claims 19 and 22, arguments analogous to those presented for Claim 9 are applicable to Claims 19 and 22. Regarding Claim 22, Aloni et al further disclose a processor for executing stored program instruction; and a memory connected to processor for storing the program instructions steps (Figure 1/ 2 and 13, Processor 67. Memories for storing the program instruction steps are inherently a part of and necessarily connected to the processor.).

5. Claims 5 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Aloni et al (U.S. 5,619,429) further in view of Neary et al (U.S. 6,016,357) and Mansfield et al (U.S. 5,965,306).

Regarding Claim 5, neither Aloni et al nor Neary et al explicitly disclose a method according to Claim 1, further comprising a step of categorizing defects based on simulation results produced in step (c). Mansfield et al disclose a method of determining the printability of photomasks defects comprising a step of categorizing defects based on the simulation results (Column 7, Lines 41-46; Column 9, Lines 13-21. Based on the mask critical dimension (CD) errors, the defects are categorized to verify whether it is necessary to be repaired or not. This will determine if an undesirable feature on a mask (reticle) is a critical defect or not.). It would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify Aloni et al

and Neary et al combination according to the teachings of Mansfield et al to categorize the defects based on simulation results produced in step (c) because it will limit the repairs of the defective reticles to those which will adversely affect the performance of the semiconductor integrated circuit.

With regards to Claim 12, arguments analogous to those presented for Claim 5 are applicable to Claim 12.

6. Claims 18 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Aloni et al (U.S. 5,619,429) further in view of Neary et al (U.S. 6,016,357) and Medvedeva et al (U.S. 6,171,731).

Regarding Claim 18, neither Aloni et al nor Neary et al explicitly disclose a computer readable medium according to Claim 17, comprising at least one of a magnetic diskette, magnetic tape, a CD-ROM, a random access memory chip, and a read-only computer memory chip. The indicated memories are the conventional types of memories as disclosed by Medvedeva et al. Medvedeva et al disclose an aerial image simulation system for the aerial images produced by a mask to be used in patterning an integrated circuit chip including a computer readable medium comprising at least one of a magnetic diskette, magnetic tape, a CD-ROM, a random access memory chip, and a read-only computer memory chip (Figure 10; Column 19, Lines 4-13). It would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify Aloni et al and Neary et al combination according to the teachings of Medvedeva et al to include a computer readable medium comprising at least one of a magnetic diskette, magnetic tape, a CD-ROM, a random access memory

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chip, and a read-only computer memory chip because these are the conventional types of memory routinely utilized in the art.

With regards to Claim 20, arguments analogous to those presented for Claim 18 are applicable to Claim 20.

Other prior art cited

7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

U.S. Patent 6,223,139 to Wong et al is cited for kernel-based fast aerial image computation for a large scale design of integrated circuit patterns.

U.S. Patent 5,475,766 to Tsuchiya et al is cited for pattern inspection apparatus with corner rounding of reference pattern data.

Contact Information

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mehrdad Dastouri whose telephone number is (703) 305-2438. The examiner can normally be reached on Monday to Friday from 8:00 a.m. to 4:30 p.m.


If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amelia Au can be reached on (703) 308-6604.

The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9314 for regular communications and for After Final communications.

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Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 305-4700.


Mehrdad Dastouri
Patent Examiner
Group Art Unit 2623
July 3, 2001


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